Claims

1. A laser range finding apparatus, comprising:

an oscillator for producing a series of optical pulses having a controlled
5    repetition rate;

an optical subsystem for receiving said optical pulses for passing
therethrough a first portion of optical energy generated by said optical pulses
to a target, and redirecting a second portion of said optical energy;

a control subsystem responsive to said second portion of said optical
10   energy for determining a repetition period between said optical pulses, and for
applying a signal to said oscillator to adjust said controlled repetition rate; and

wherein said first portion of said optical energy is reflected by said
target back to said optical subsystem and used to control the generation of
subsequent optical pulses from said oscillator in relation to a round trip time of
15   flight of said optical pulses between said apparatus and said target, said time
of flight being used to extrapolate a distance between said laser oscillator and
said target.


2. The apparatus of claim 1, wherein said oscillator comprises an
20   optical relaxation oscillator.


3. The apparatus of claim 1, wherein said optical subsystem
comprises an optical beam splitter.


25   4. The apparatus of claim 1, wherein said control subsystem
comprises:

a photodetector responsive to said second portion of said optical
energy for generating an electrical signal representative of said controlled
repetition rate; and
30   a controller responsive to an output of said photodetector for
generating said signals for adjusting said controlled repetition rate.

5. A method for determining a distance to a target, comprising:

generating a plurality of relaxation oscillations having a controlled frequency;

5      using said relaxation oscillations to generate a series of optical pulses at a controlled repetition rate;

splitting optical energy generated by said optical pulses into first and second portions;

causing said first portion of optical energy generated by said optical

10    pulses to be directed at said target spaced apart a distance from an apparatus generating said relaxation oscillations;

using said second portion of said optical energy to determine a repetition rate of said optical pulses;

using said determined repetition rate to adjust a repetition rate of

15    subsequently generated optical pulses;

collecting at least a portion of said first portion said optical energy reflected from said target and using said collected optical energy to further control the generation of said subsequent relaxation oscillations, and therefore subsequent optical pulses, in relation to a round trip time of flight of

20    said collected optical energy between said apparatus and said target; and

using said round trip time of flight to calculate said distance between said apparatus and said target.

6. A method of determining a distance between a reference point and a target using a laser oscillator, comprising:

using a laser oscillator located at said reference point to generate
5 relaxation oscillations that in turn cause a plurality of optical pulses to be generated at a controlled repetition rate;

directing said optical pulses at a target located at an unknown distance from said laser oscillator;

adjusting a power of a laser pump used with said laser oscillator to thus
10 vary a frequency of said relaxation oscillations, and thus vary a frequency of said optical pulses; and

detecting when a received optical pulse reflected from said target has seeded a pump cavity of said laser oscillator and caused a subsequent, seeded optical pulse to be generated by said laser oscillator; and

15 when said subsequent, seeded optical pulse is generated, locking a period of each subsequently generated relaxation oscillation;

using a period of one of said subsequently generated relaxation oscillations to extrapolate a time of flight of said received optical pulse that caused said seeded optical pulse to be generated; and

20 using said time of flight to determine a distance between said laser oscillator and said target.